Type «A» Taintor Valves Bulkhead

Underwater slot scanning & data analysis

New Measurement Tools

for

Type «A» Taintor Valves Bulkhead Slot Inspection

M4/135-29 (2013-2014)

Prepared by: Pierre ROBY ing./P.Eng.

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Canada

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The Great Lakes
St. Lawrence Seaway System

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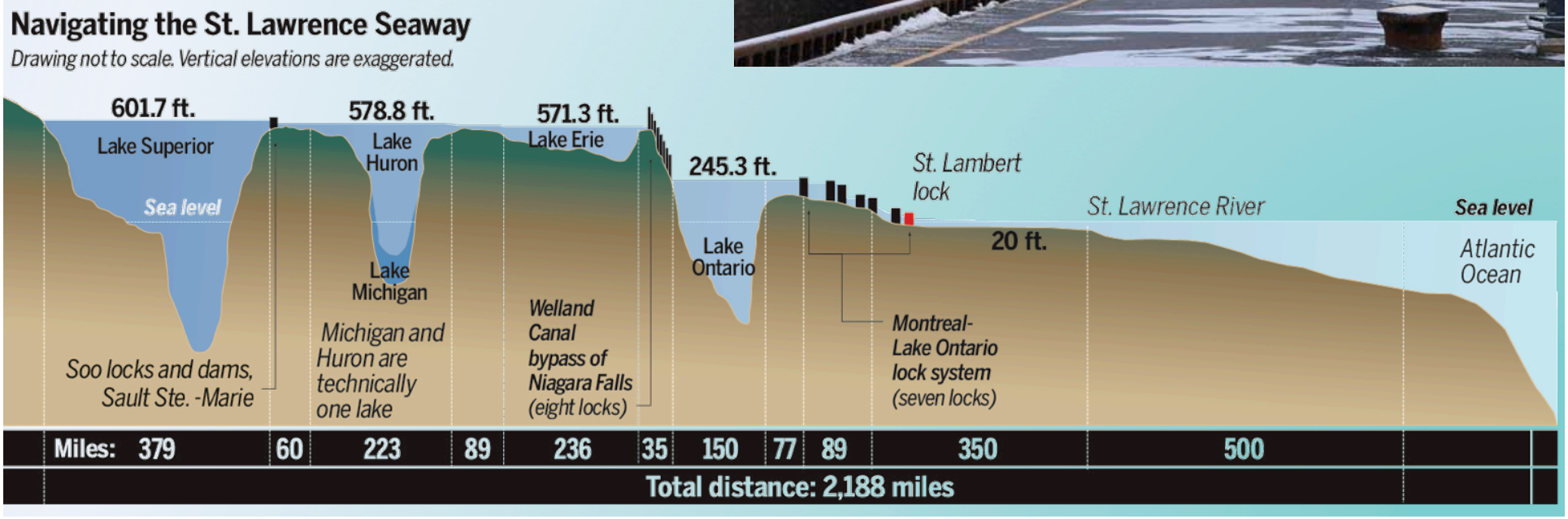
Maisonneuve region

Lock Nº:1 St-Lambert
Lock Nº:2 Côte-Ste-Catherine
Lock Nº:3 Lower Beauharnois
Lock Nº:4 Upper Beauharnois
Lock Nº:7 Iroquois (Ont)



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Bulkheads

- Canadian Seaway locks, Maisonneuve region has 16 Type «A» Taintor Valves 32 Bulkheads
- Bulkheads are temporary gates required for emergency dewatering of Taintor valves during NAV season

ENCOUNTERED PROBLEMS

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Discriminating Problems

- Bulkhead seizure resulting from internal slots deformations:
  Caused by AAR (Alkali-Aggregate Reaction)
- Unable to measure or inspect properly:
  Caused by restraint access, underwater during navigation season, packed of ice accumulation when dewatered
- High cost for complete revamping of bulkhead slots

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Restrained access

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Complete revamping expensive

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BENCHMARK

Common Measurement Problems

- Similar problems encountered at Hydro-Quebec: Hydro-Quebec went for the development of a submarine precision scanning tool. Technology transferred to private business «Exactam».

NEW DESIGN OBJECTIVES

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Objectives

- Obtain reliable measurement in order to properly locate asperities in slot and eventually go for local repairs and avoid full rehabilitation.
- Be able to repeat and reproduce measurement for accurate trend.

SITE INSPECTION

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Approach

- Inspection will be carried during NAV season to avoid any ice accumulation and gain enough time before dewatering, therefore rendering the Hydro-Quebec tool inescapable.

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DATA RECORDED

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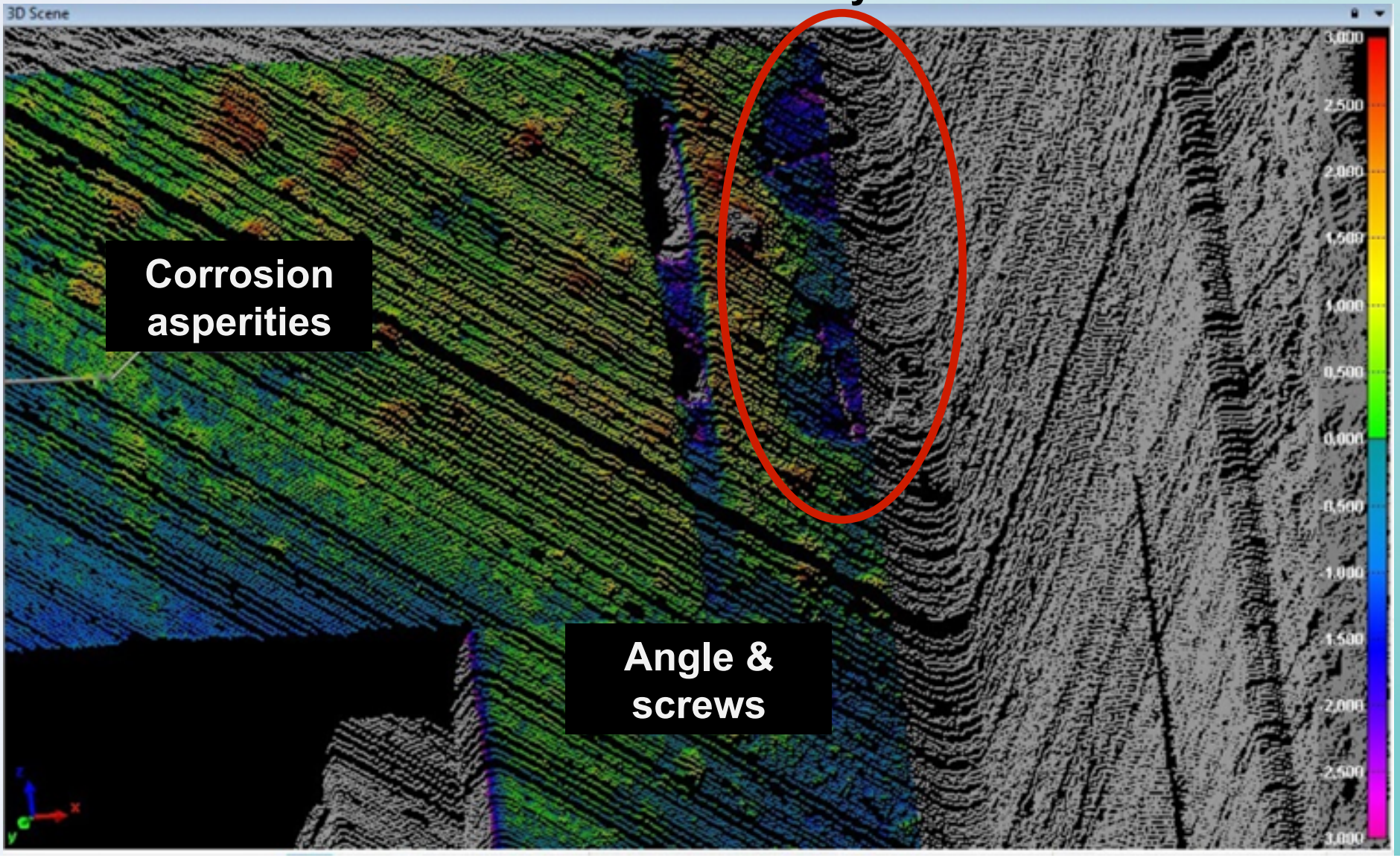
Resolution delivered by scan



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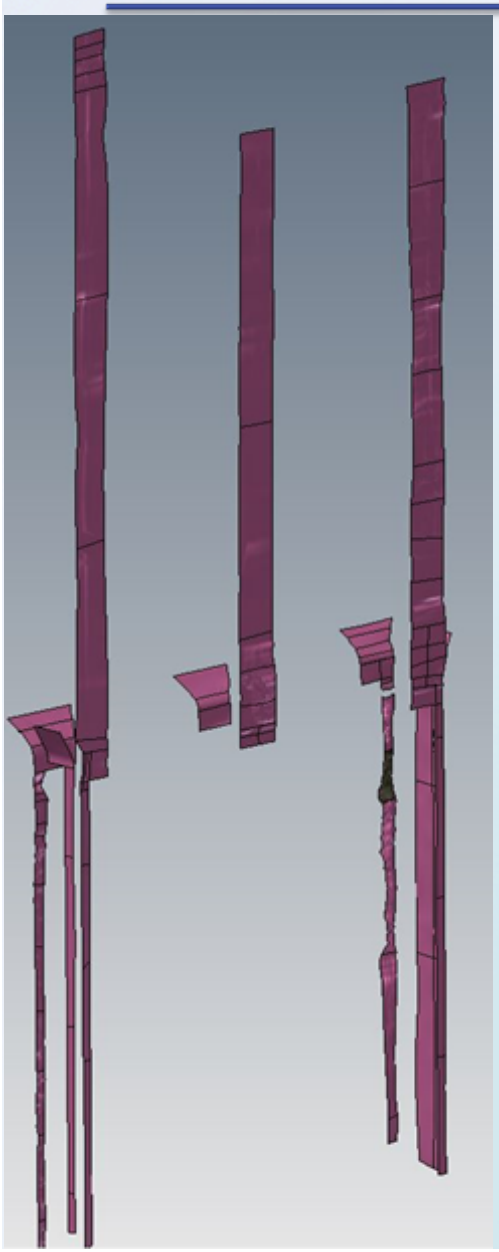
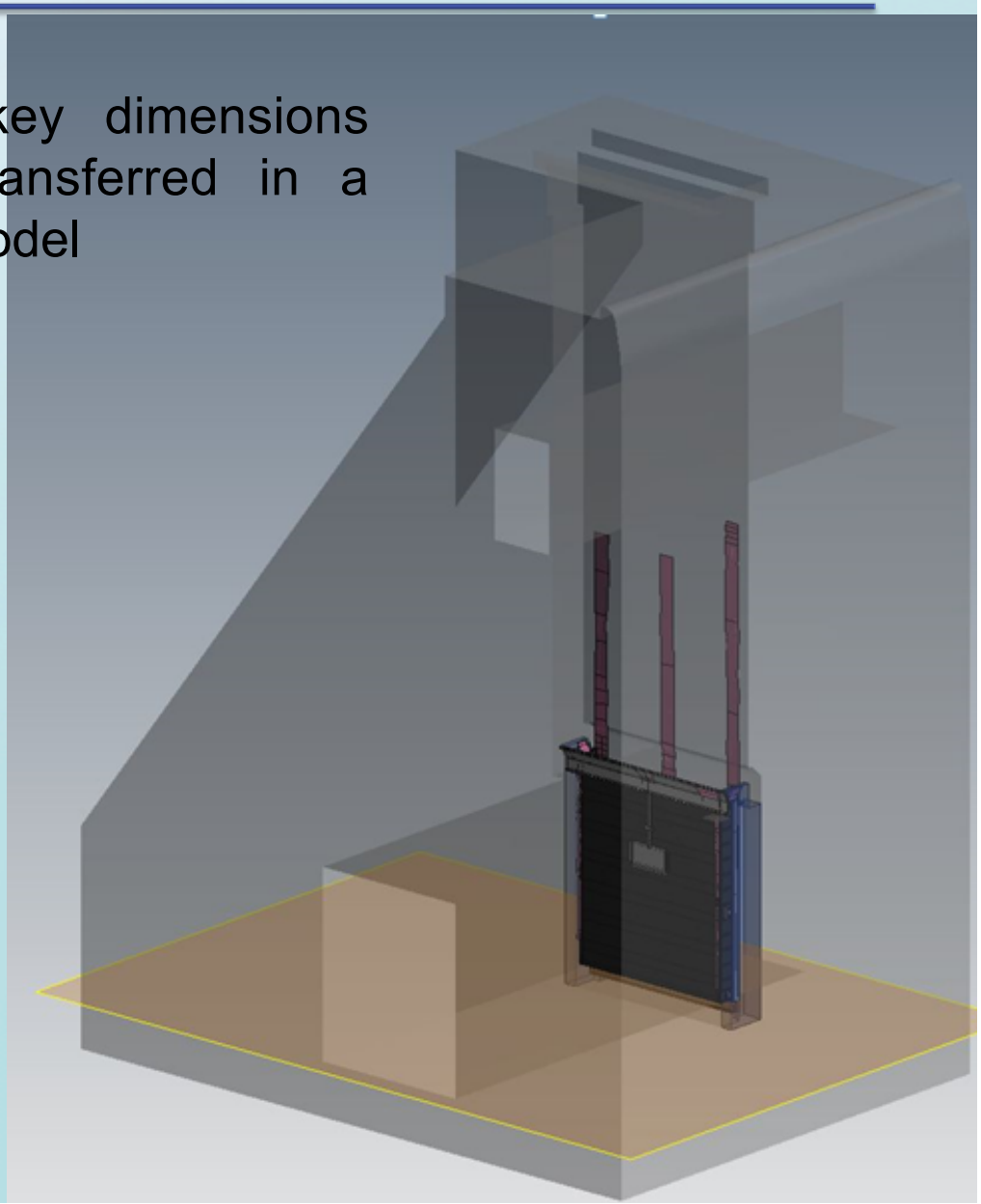


Bulkhead slot key dimensions measurement transferred in a «Inventor» 3D model



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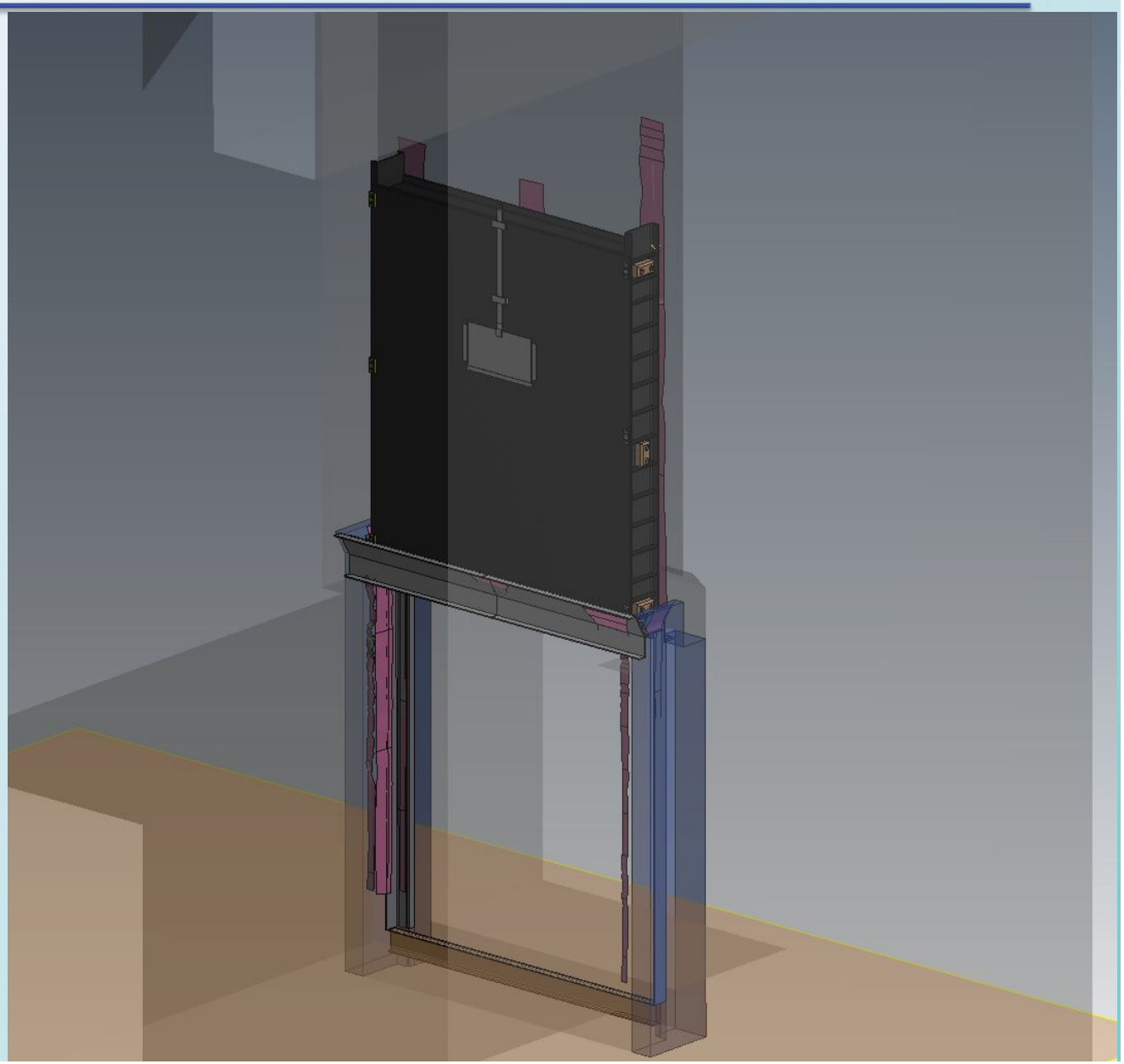
Virtual insertion trial & and interference localization.



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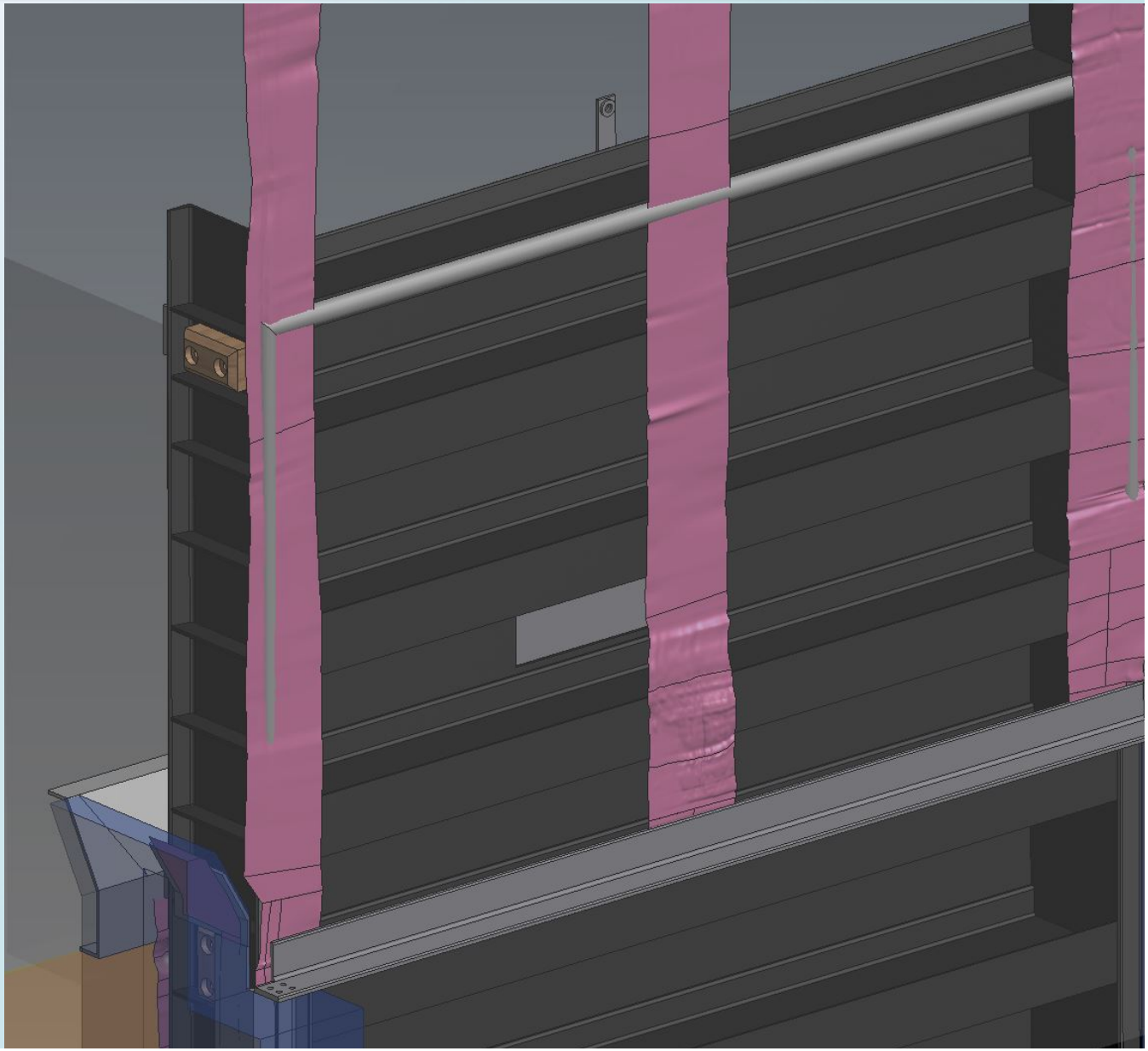
Engineering of local repair adapted to each bulkhead slots after interferences analysis.



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Complete revamping expensive

PROJECT ASSESSMENT

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Project Assessment (Went well)

- Final results are excellent, concrete will be scarified locally;
- Costs avoidance on revamping (targeted corrective repair).

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Project Assessment (To Improve)

- Water movement during and after lock operation causing delays ~ laser is unstable;
- Preparation and set up time;
- Data conversions from «Cloud point» to «IGES», then integrated in hybrid model into Inventor (solid and surfaces model).

ACKNOWLEDGEMENTS

Datas Analysis Review

Martin Beaudet - Draftsman
Richard Dufresne - EXACTAM

Engineering

Alain Fafard - ing. / PEO
Martin Beaudet - Draftsman

Senior Engineer

Pierre Roby - ing. / PEO

QUESTIONS / COMMENTS

Pierre ROBY ing. / PEO

Senior Mechanical Engineer
St-Lawrence Seaway Management Corporation
Phone: (450) 672-4115 ext : 2407
E-mail: proby@seaway.ca